Low Power X-Band BUC

Installation and Operation Manual

IM02960219 Rev.A

Agilis

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Table of Contents

Chapter 1 Product Overview 1
1.1 About The BUC 1
1.2 BUC Functions 2
1.2.1 BUC Functional Block Diagram 2
1.2.2 Frequency Band Options 3
1.3 BUC Interfaces 4
1.3.1 BUC Front View 4
1.3.2 BUC Right Side View 4
1.4 Product Models 5

Chapter 2 System Configurations 7
2.1 Types of System Configurations 7
2.1.1 Stand-Alone System Configuration 7

Chapter 3 Installation 9
3.1 Unpacking the Box 9
3.2 Pre-Installation Preparations 10
3.2.1 Environmental Considerations 10
3.2.2 Tools Required 10
3.2.3 Site Preparation Checklist 10
3.2.4 Power Supply 11
3.2.5 Pre-Installation Test 12
3.3 Installing the BUC & Other Components 13

Chapter 4 BUC Setup and Management 17
4.1 Monitor & Control 17
4.2 Using the Agilis EMS Software 17
4.2.1 Connecting the PC to the BUC 17
4.2.2 Installing the Agilis EMS Software 18
4.2.3 Launching the Agilis EMS Software 19
4.2.4 Main User Interface 19
4.2.5 Types of Users 20
4.2.6 Selecting the Device to Manage 20
4.2.7 Modifying Configuration Parameters 24
4.3 Monitor & Control via HTTP (Web) 25
4.3.1 Connecting the PC to BUC 25
4.3.2 Connecting to the Web Interface 25
4.3.3 Monitoring BUC Status 29
4.3.4 Configuring the BUC 31
4.3.5 Setting Up SNMP Parameters 33
4.4 Monitor & Control via SNMP 34
4.4.2 Connecting the PC to BUC 35
4.4.3 Connecting to the SNMP Interface 35
4.4.4 Managing the BUC via an SNMP Manager 37

Chapter 5 Maintenance & Troubleshooting 43
5.1 Preventive Maintenance 43
5.1.1 Gains Testing 44
5.1.2 Completing the Maintenance 45
5.2 Understanding Faults in the BUC 46

Appendix A Customer Service 49
A.1 Warranty Information 49
A.2 Return Material Authorization (RMA) 50
A.3 Additional Technical Support 52

Appendix B Unit Specifications & Outline 53
B.1 System Specification Tables 53
B.2 Unit Outline Drawings 55

Appendix C Compliance Standards 57

Appendix D Document Revision Log 59

List of Figures

Figure 1.1 BUC functional block diagram 2

Figure 1.2 Front view of the Low Power X-BUC 4

Figure 1.3 Right side view of the Low Power X-BUC 4

Figure 2.1 Low Power X-Band BUC Stand-Alone Configuration Setup 7

Figure 3.1 Mounting the X-BUC and LNB on the OMT of the antenna 13

Figure 3.2 Sealing the connectors 15

Figure 4.1 Connecting PC to BUC via the USB/RS485 converter 17

Figure 4.2 **AgilisEMS.exe** icon 18

Figure 4.3 Agilis EMS Main User Interface 19

Figure 4.4 Configuration button 24

Figure 4.5 Connecting via RJ45 25

Figure 4.6 Configuring static IP 26

Figure 4.7 Disabling proxy server 27

Figure 4.8 BUC's web interface 28

Figure 4.9 BUC and network status information 29

Figure 4.10 BUC alarm status information 30

Figure 4.11 Logging in 31

Figure 4.12 Device Configuration Screen 32

Figure 4.13 SNMP v2c configuration settings 33

Figure 4.14 SNMP MIB categories 34

Figure 4.15 Connecting via the RJ45 35

Figure 4.16 Example MIB tree 36

Figure 4.17 MIB tree 37

Figure 4.18 SNMP WALK 41

Figure B-1 4W X-BUC outline drawing 55

List of Tables

Table 1-1 BUC Transmit Frequency Bands for Compact Low X-BUC 3

Table 1-2 Interfaces present on the front of the BUC unit..... 4

Table 1-3 Interfaces present on the right side of the BUC unit 4

Table 1-4 Pin-out configuration for M&C..... 5

Table 1-5 Product series models 5

Table 2-1 List of accessories and components for standalone system 8

Table 4-1 Cable pin-out configuration.....17

Table 4-2 Types of Users.....20

Table 5-1 AC power tolerance 44

Table 5-2 Troubleshooting faults in the BUC 46

Table A-1 Pre-RMA Request Checklist.....50

Table B-1 BUC specification tables.....53

Chapter 1 Product Overview

Agilis, a global leader in the design, development and manufacturing of quality satellite products for various applications, introduces the Low Power X-Band Block Up Converter (BUC).

The Agilis Low Power X-Band Block Up Converter (BUC) offers a wide range of distinctive advantages and enhanced features for satellite communication systems in remote or challenging geographic regions. Its innovative and robust design makes it very reliable under harsh environment conditions.

This user manual provides detailed information to system integrators and end users on how to set-up, operate and maintain the Low Power X-Band Block Up Converter (BUC).

1.1 About The BUC

The Low Power X-Band Block Up Converter (BUC) is a high performance, cost-effective RF transmitter designed for satellite communication with high speed transmission capability suitable for both telephony and high speed data communication.

The X-Band BUC can be operated with different modulation formats such as BPSK, QPSK and FM. Due to stringent performance specifications; it is suitable for the following applications:

- Single Carrier Per Channel (SCPC)
- Multi-Carrier Per Channel (MCPC)
- Demand Assigned Multiple Access (DAMA)
- Time Division Multiple Access (TDMA)

Baseband signals are modulated onto L-band frequency and multiplexed with 10 MHz reference. It is then up converted and amplified in the Low Power X-Band BUC for transmission to the satellite via an antenna dish.

The Low Power X-Band Block Up Converter (BUC) is an outdoor unit mounted directly onto the orthogonal mount transceiver (OMT) of the antenna. The transmit output waveguide is WR112G. A yellow transparent tape is laminated onto the waveguide to prevent water ingress through the waveguide.

1.2 BUC Functions

1.2.1 BUC Functional Block Diagram

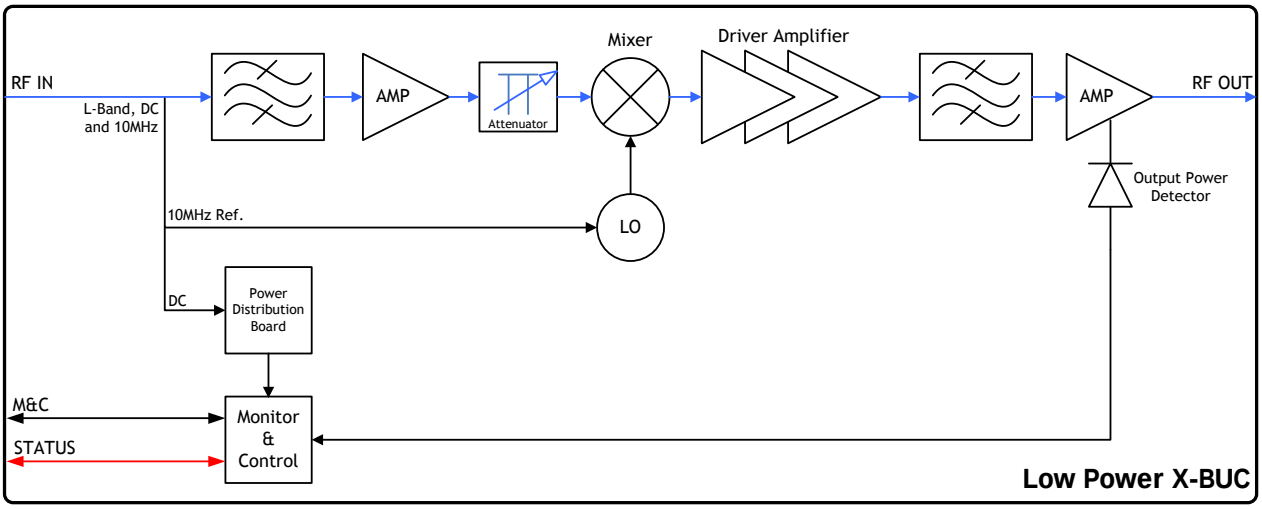

Figure 1.1 BUC functional block diagram

The main function of the X-Band Block Up Converter (X-BUC) is to up convert L-band transmit signal to the X-Band transmit frequency range and amplifies it by an integrated SSPA. The X-BUC is a single stage up conversion from L-band to X-Band frequencies using a 10 MHz external referenced phase locked oscillator.

The BUC includes the following function modules:

- Demultiplexer

  The DEMUX module splits the external 10 MHz reference, L-band and DC power supply that are carried to the BUC by the input coaxial cable.

- Up Converter

  The L-band transmit signals received from an indoor modem is passed through a high pass filter (to reject interference and harmonics) and then up-converted by the U/C with a LO signal, achieving the desired RF transmit X-band frequency.

- Synthesized local oscillator

  LO signals used by the U/C are derived from a frequency synthesizer. This synthesizer is externally referenced to a 10 MHz sine wave oscillator.

- Solid state power amplifier

  Each BUC has an internal SSPA module. The BUC feeds up-converted signals into an internal SSPA module to be amplified for transmission to the satellite via the antenna. The SSPA uses high power FETs to generate the required output power. The SSPA operates on DC power internally generated by the internal power supply unit.

- Monitor and control

  The M&C module is the central processing hub of the X-BUC. It is developed on an embedded microcontroller to perform the required monitoring and control functions. The unit can be connected to a remote PC via serial communication using RS485 interface or through Ethernet (SNMP and WebUI). Using the M&C module, you can:

  - Control the BUC
  - BUC temperature
  - LO unlocked alarm
  - Monitor RF (RF output power and temperature) and electrical readings.
  - Check alarm status
  - LED status indicator

- Power Supply

  The unit works with a 24V DC (18-60V DC range) supply derived from the IFL cable. The X-BUC has built-in DC-DC converters which convert the power supplied from the IFL cable to the required voltages of the internal X-BUC modules.

- Cooling sub-system

  All RF modules are placed on a heat sink for effective heat dissipation.

  An over-temperature switch monitors the internal temperature of the unit. When the temperature exceeds acceptable operating limits, the SSPA module is automatically disabled, minimizing damage to the power devices.

1.2.2 Frequency Band Options

Table 1-1 BUC Transmit Frequency Bands for Compact Low X-BUC

Input Transmit (MHz)	Local Oscillator (GHz)	Output Transmit (GHz)
950 – 1450	6.95	7.900 – 8.400

1.3 BUC Interfaces

1.3.1 BUC Front View

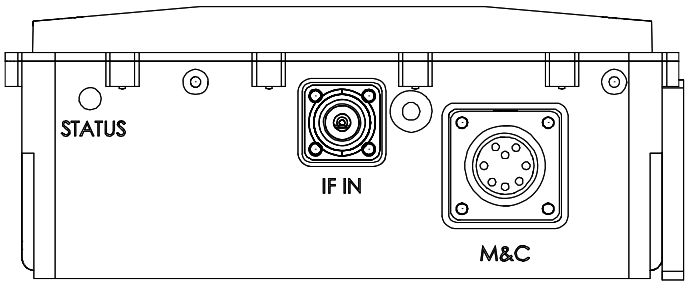

Figure 1.2 Front view of the Low Power X-BUC

Table 1-2 Interfaces present on the front of the BUC unit

Port Reference	Connector Type	Signal Details
IF IN/RF IN	50Ω N-type connector	L-band input signal with 10MHz reference
M&C	8-pin square flange female connector	M&C port to be connected to the PC/laptop
STATUS	LED	

1.3.2 BUC Right Side View

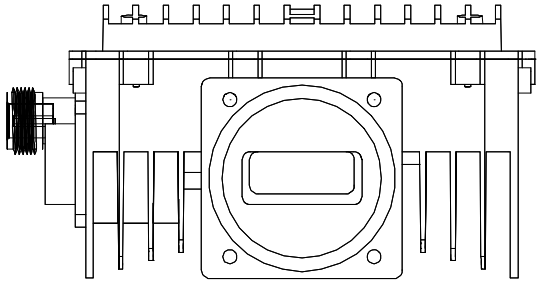

Figure 1.3 Right side view of the Low Power X-BUC

Table 1-3 Interfaces present on the right side of the BUC unit

Port Reference	Connector Type	Signal Details
RF OUT	WR112G waveguide flange	RF signal

Table 1-4 Pin-out configuration for M&C

	Pin #	Function
Serial	Pin B	Ground
	Pin E	RS485-
	Pin F	RS485+
Ethernet	Pin A	Tx+
	Pin C	Tx-
	Pin G	Rx+
	Pin H	Rx-
	Pin D	Status

1.4 Product Models

This manual is suitable for the following Low Power Compact X-BUC models:

Table 1-5 Product series models

Model Type	Model #
4W X-Band BUC	ALBX50XXX4X
5W X-Band BUC	ALBX50XXX5X
10W X-Band BUC	ALBX50XXX10X

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Chapter 2 System Configurations

This chapter explains, in detail, the system in which the BUC is deployed in and its various components.

2.1 Types of System Configurations

The X-BUC unit can be deployed in a standalone system configuration.

The Standalone system configuration is explained below.

2.1.1 Stand-Alone System Configuration

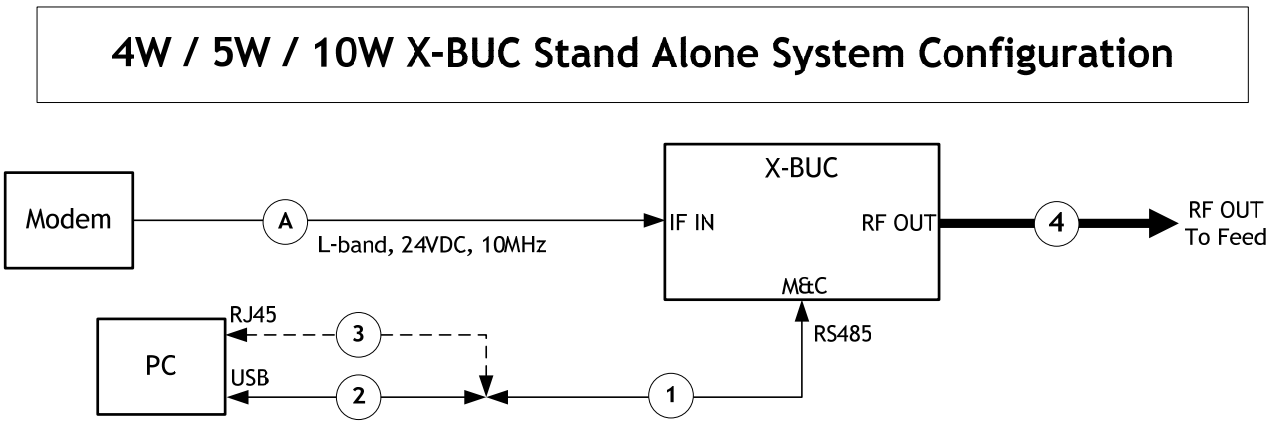


Figure 2.1 Low Power X-Band BUC Stand-Alone Configuration Setup

The table below lists the accessories and components that can be obtained from Agilis to setup the system. This setup diagram and table can also be found at the back of this manual for your convenience.

Table 2-1 List of accessories and components for standalone system

Item No.	Agilis Part No.	Description	Length (m)	Quantity
1	2502041169	C/A For VSAT SPT to RS485	2	1
2	6103480008	Converter RS485 to USB	-	1
3	2502041166	Ethernet Cable DB9 to RJ45 For SNMP config (Optional)	-	1
4	4203480039	Rx Reject Filter	-	1
A	-	RF Cable (L-Band)	To be arranged by customer	
-	ALBX50	X-BUC	-	1

🕮 **Note:** The table above is a typical accessories list for the BUC. Depending on your purchase order, your BUC package may not include certain optional cables. Please contact Agilis if you wish to purchase any of the above accessories.

Chapter 3 Installation

This chapter explains a step-by-step process to safely mount and install your Agilis products.

WARNING: Always handle the X-BUC with care. Dropping or knocking it may cause damage to the unit. Agilis' warranty does not extend to defects due to excessive shock or vibration.

Do not operate the X-BUC without a cable or a RF load connected to the RF OUTPUT waveguide port. The load should be at least double the BUC wattage.

3.1 Unpacking the Box

Before unpacking the box, check if it had been damaged or opened. If the shipment may have been tempered with, open the box in front of a representative from the shipping company.

Upon opening the box, carefully remove the items in the package and check them against the packing list. If any of the items are damaged or missing, please contact Agilis or your local Agilis representative before proceeding.

We recommend that you keep the original packing materials until you have completed the checks and confirmed that the unit is in working order.

If you need to repack the product for shipping, please use the original shipping container and packing materials whenever possible. Alternatively, you may also use high quality commercial packing materials to repack the unit. Please seal the container firmly and clearly mark **"FRAGILE Electronic Equipment"** on the exterior.

3.2 Pre-Installation Preparations

3.2.1 Environmental Considerations

The Low Power Compact X-BUC is an outdoor unit mounted directly onto the orthogonal mount transducer (OMT) of the antenna. The unit's aluminium chassis is coated with white, enamelled epoxy for environmental protection. All interface connectors are sealed to prevent air and moisture from entering the unit.

According to the instructions supplied by the antenna manufacturer, locate and install the antenna in an area that is free from RF interference from motors and electronic equipment. A clear line of sight from the antenna to the satellite is essential. To ensure safety and protection of personnel and equipment, lightning arresters should also be used at the site. Size 3/0 or 4/0 stranded copper wire should be used to bond the X-BUC and LNB to the antenna frame and to the lightning protection ground rod. The grounding resistance of the antenna should not be more than 10 Ω.

Before proceeding with the mounting process, please ensure that the environmental conditions in the area where the BUC is to be mounted is appropriate for its optimal operation. These include:

- Temperature: -40ºC to +60ºC
- Relative Humidity: Up to 100% Weather protection sealed to IP65

3.2.2 Tools Required

We highly recommend having the following tools on hand before starting the installation:

- 1 complete set of socket wrench
- 1 Philips head screwdriver
- 1 cutter
- 1 bag of cable ties (long and medium length)
- 1 multi-meter

3.2.3 Site Preparation Checklist

The following table provides a checklist to help you ensure that your site is adequately equipped to perform the installation.

Checklist Item	Y/N
Equipment required for site survey	☐ Inclinometer ☐ Compass / DataScope ☐ 1-meter rectangular bar ☐ Scientific calculator ☐ 100-meter measuring tape ☐ Site location map ☐ GPS receiver ☐ Road distance wheel ☐ Vernier calliper

Checklist Item	Y/N
	☐ Location markers / flags
Is site in the satellite footprint?	☐ Yes ☐ No
Approximate length of cables between ODU and IDU	
IF cable routing method	☐ Underground ☐ Surface
Is there a clear path for cables from ODU to IDU?	☐ Yes ☐ No
Proposed mounting location	☐ Antenna structure ☐ Near the antenna ☐ Inside the shelter ☐ Other: _____
Does the mounting location provide the best route for cables from IDU to ODU to antenna?	☐ Yes ☐ No
Is there an unobstructed view from the satellite(s) of interest?	☐ Yes ☐ No
Are there any hazards near the site location that may damage or obstruct the ODU? (old buildings, trees, planned future construction)	☐ Yes ☐ No If yes, please specify: _____
Are there possible RF interference from other nearby telecommunication towers?	☐ Yes ☐ No
Will your installation cause interference to other nearby setup?	☐ Yes ☐ No
Is sufficient power supply available?	☐ Yes ☐ No
Is grounding available?	☐ Yes ☐ No
Is the site prone to the following?	☐ Heavy wind ☐ Heavy rainfall ☐ Ice/snow accumulation ☐ Extreme temperatures ☐ Sand/Dust storms ☐ Others: _____

3.2.4 Power Supply

POWER SUPPLY – LOW POWER COMPACT X-BUC

The Low Power Compact X-BUC derives its voltage supply through the centre conductor of input connector. The Low Power X-BUC works on a 24V DC (18-60V DC range) supply.

3.2.5 Pre-Installation Test

Performing a pre-installation test prior to the actual field installation helps you to:

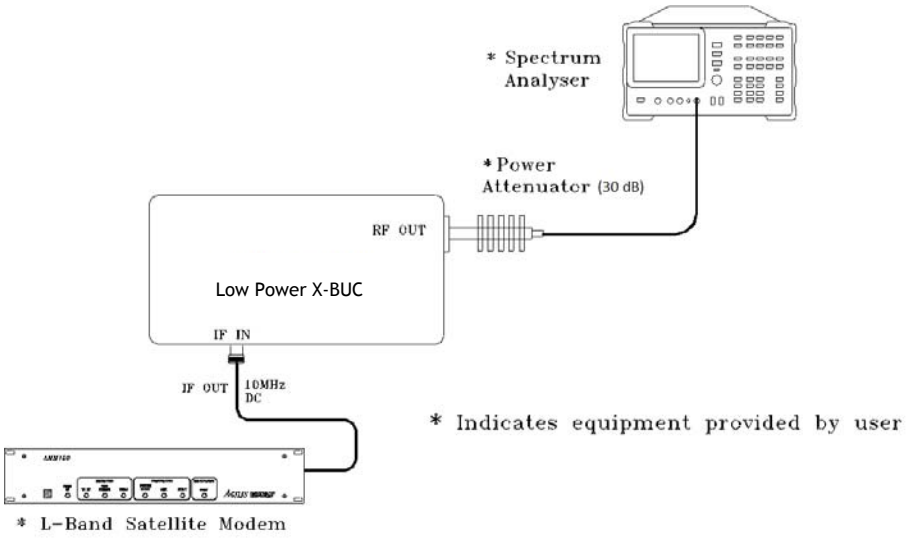
- Confirm that the unit has not been damaged during shipment.
- Check that the unit is in working order before performing a tiring and costly mounting procedure on your antenna.
- Following are the test procedures for the ODU system.

🕮 Note: Ensure that no alarm or fault appears on the Low Power Compact X-BUC before performing any test.

🕮 Note: To avoid damaging the X-BUC accidentally, connect a 30 dB, > 20W power attenuator to the RF output.

UPLINK TEST PROCEDURE

Step 1 Connect the X-BUC as shown in the figure below and power up the system.



Connection for uplink test procedure

🕮 Note: * represents equipment not provided by Agilis

Step 2 Use the modem to input an L-Band pure carrier (by turning on the transmit carrier and set the pure carrier feature to ON). Adjust the modem output power so that the IF level input to X-BUC is -25 dBm.

Step 3 Measure the RF OUT of the X-BUC using a spectrum analyzer at X-Band.

1. Calculate the total transmit gain based on this formula: *Output power – Input power + Amount of attenuation*.
2. Compare the result against the specifications (Appendix B Unit Specifications & Outline). If there is no signal, check that the channel setting is correct.

   Example:

   Transmit gain = RF OUT power - IF IN power + Attenuation =

   8 - (-25) + 30 = 63 dB

3.3 Installing the BUC & Other Components

Step 1 All Agilis components in this system are outdoor mounted equipments designed to withstand most weather conditions. Mount the BUC onto the antenna OMT.

A set of mounting accessories is provided to mount the X-BUC to the OMT of the antenna.

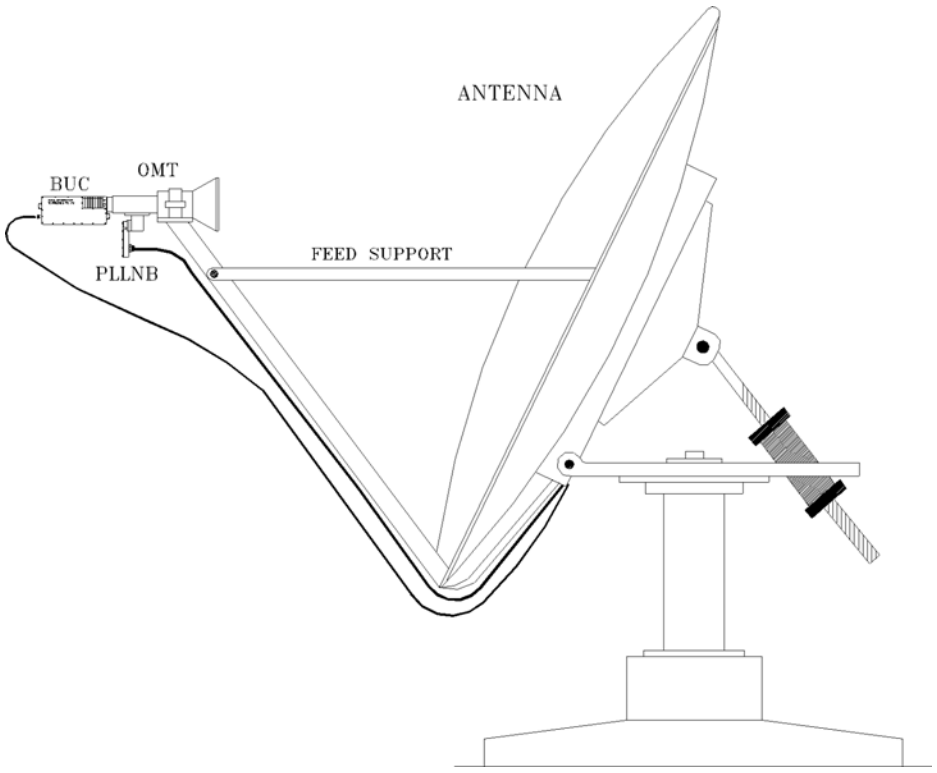


Figure 3.1 Mounting the X-BUC and LNB on the OMT of the antenna

Step 2 Connecting the BUC

The following connections need to be performed if you are setting up the BUC in a standalone system configuration.

1. Connect the IF IN/RF IN port of the BUC to an indoor modem using a standard IF coaxial cable.
2. Connect the M&C port of the BUC to an indoor terminal (such as a PC) for monitoring purposes using the M&C cable provided.

Step 3 Grounding the installation

This process provides a conductive path for static electrical charges to be discharged safely from the equipment to the ground. This prevents a build up of static charges that may cause the equipment to spark.

1. Locate an appropriate grounding spot. Most soil has sufficient conductivity to allow for an efficient grounding connection. Soils that are mainly rock may need to be treated with additional minerals like rock salt, copper sulphate or magnesium sulphate to increase their conductivity.
2. Drive a 3m lightning rod into the ground about 30cm from the antenna pole. Bolt an aluminium wire, minimum 9mm in diameter, to the ground pole. A tight clamp is used to make contact at the top end. Avoid sharp bends when routing the wire as these may impede current flow.
3. Using size 3/0 or 4/0 stranded wires, bond the Compact Low Power X-BUC and other components to the antenna frame and lightning protection ground rod.

🕮 Note: Grounding resistance of the antenna should be no more than 10Ω.

⚠ **WARNING:** Please ensure that the wire is tightly connected between the rod and the equipment to prevent sparks.

Step 4 Switch on the power to the unit.

⚠ **WARNING:** Please ensure that the DC power source is off from the modem before connecting the IFL cable to BUC.

FOR STAND ALONE SYSTEMS

Connect the DC power source to the BUC using modem or external multiplexer. Ensure that all connections have been completed before turning on the power supply.

The BUC will automatically power on when an appropriate DC current is fed into the unit. The LED indicator should light on, indicating that the device is turned on. The following table explains the LED colors.

LED Color	Description
Green	BUC is operating normally
Red	BUC has an alarm condition
Amber	BUC is offline or power is low
No Light	This can mean either: 1) BUC is not receiving power 2) LED failure

Step 5 Sealing the cables

To complete the physical installation, all connectors and important joints in the system must be sealed. Note that the sealing must begin from the chassis of the ODUs up to the heatshrink of the cable.

All unused connections must be sealed to prevent water ingress. Waveguide joints must be equipped with an appropriate gasket. Please ensure that all connectors are hand tightened before sealing.

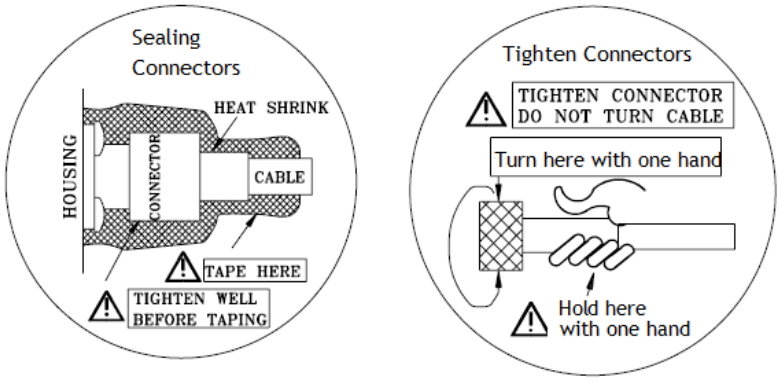


Figure 3.2 Sealing the connectors

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Chapter 4 BUC Setup and Management

4.1 Monitor & Control

Agilis devices can be monitored and controlled remotely via various methods including:

- Agilis EMS Software
- Optional web browser (HTTP) and SNMP protocol

This chapter looks at how you can set up and manage your BUC system using the various tools above.

4.2 Using the Agilis EMS Software

The Agilis EMS Software is a lightweight network management software that allows the user to monitor and control the X-Band BUC remotely through a PC.

4.2.1 Connecting the PC to the BUC

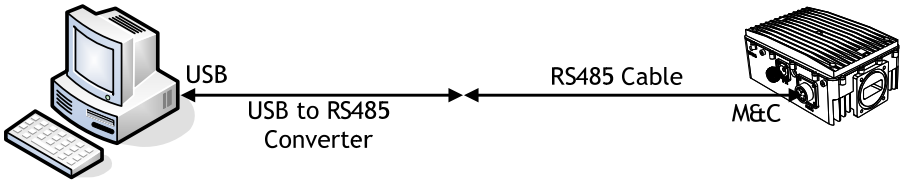


Figure 4.1 Connecting PC to BUC via the USB/RS485 converter

Table 4-1 Cable pin-out configuration

RS485 cable			USB-RS485 converter	
Male Circular	Female DB-9	Signal	Male DB-9	Signal
Pin E	Pin 2	Data+	Pin 2	Data+
Pin F	Pin 1	Data-	Pin 1	Data-
Pin B	Pin 5	Ground	Pin 5	Ground

4.2.2 Installing the Agilis EMS Software

The Agilis EMS software must be installed into a PC terminal to be used to monitor your Agilis devices.

MINIMUM SYSTEM REQUIREMENTS

- Windows XP / Windows 7 operating system
- At least 1GB Hard Disk free space
- 2GB RAM (Recommended)
- A M&C serial interface

SOFTWARE INSTALLATION

🕮 Note: For detailed information on the Agilis EMS Software, refer to IM02960173 Agilis EMS Software Installation and Operation Manual.

Step 1 Install the USB-RS485 converter driver into your PC. Please insert the CD that was included in your package into your disc drive and run the driver installation.

Step 2 If an installation CD was included in your package, please insert the CD into your PC's disc drive and unzip the setup file as indicated above.

Step 3 Launch the setup file

Locate the setup file and double click the file to start the setup.

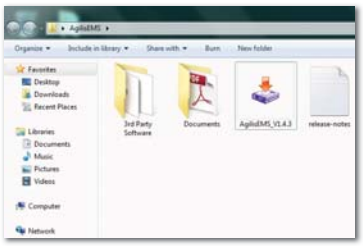


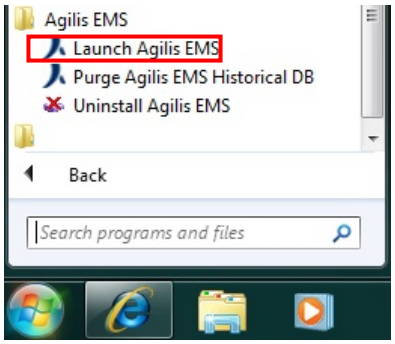
Figure 4.2 **AgilisEMS.exe** icon

Step 4 Follow the step-by-step installation instructions to install the software.

🕮 Note: You must have administrator permission on your Windows PC to install the software.

4.2.3 Launching the Agilis EMS Software

To Launch the Agilis EMS Software, click on **Start** > **All Programs** > **Agilis EMS**, click on the **Launch Agilis EMS** to start Agilis EMS.



Once all the required services are started, an Agilis icon would be displayed in the notification area usually found in the bottom right hand corner. This would indicate that the startup of services has been initiated.

An IE (Internet Explorer) window will automatically pop-up upon successful startup.

4.2.4 Main User Interface

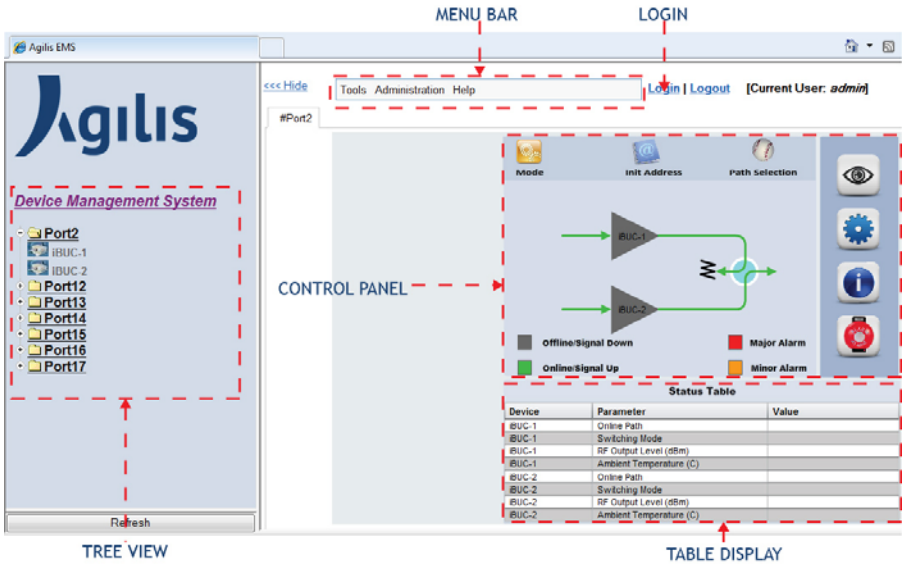


Figure 4.3 Agilis EMS Main User Interface

4.2.5 Types of Users

Table 4-2 Types of Users

User	Password	Options Available
Operator (Guest)	NA	• Analog Charts • Device Configuration
admin	admin	• Analog Charts • Device Configuration • User Management

📖 Note: It is recommended to login as an admin when configuring a device. Configuring a device using an operator account has limitations such as, the need to exit then re-launch the EMS software for the changes to take effect.

4.2.6 Selecting the Device to Manage

The Agilis EMS Software can be used to monitor and control a wide range of Agilis products (BUC, MBUC, iBUC, SSPA, LNB, RCU, AUC, SPT and OHT). The Low Power X-Band BUC is under the BUC category.

Before configuring a device, the user must first identify the COM Port assigned to the Agilis device. To identify the COM Port, follow these steps:

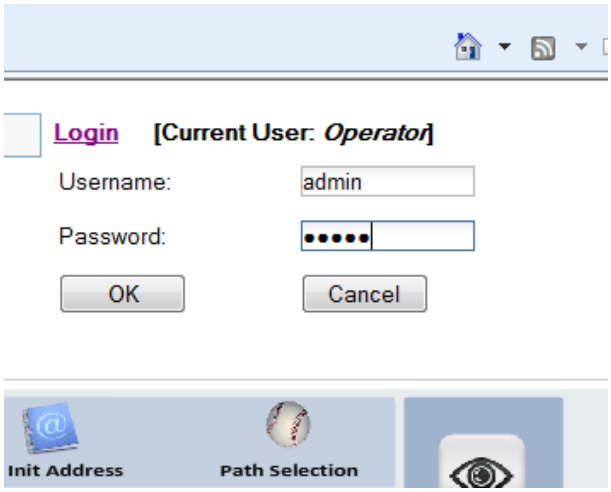
Step 1 Right click **'Computer'**, and select **'Properties'**.

Step 2 Click **'Device Manager'**.

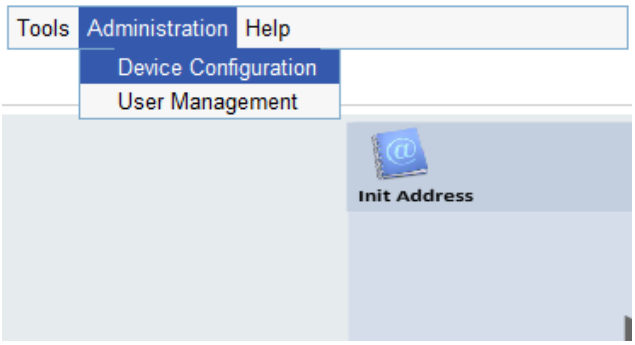
Step 3 Double-click **'Ports (COM & LPT)'** and take note of the Port number assigned to the device.

4.2.5.1 Configuring a standalone BUC

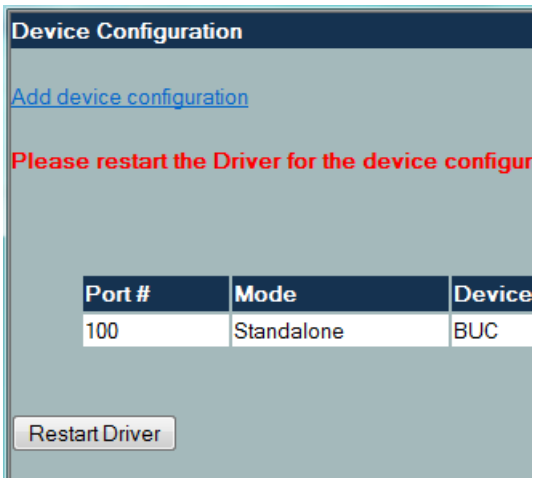
1. Login as an **'admin'**.



2. Click **'Device Configuration'** under the Administration option in the Menu Bar.



3. Click on the '**Add device configuration**' option in the Device Configuration window.

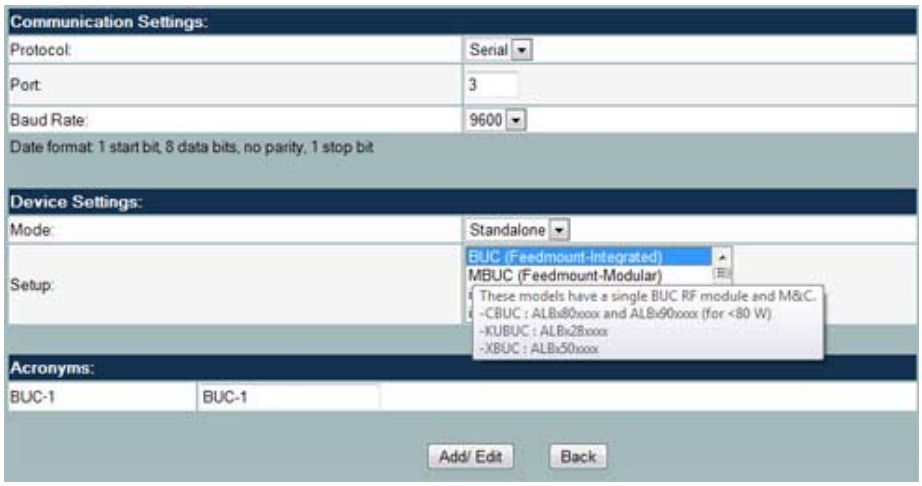


4. Under **Communication Settings**.
For this example, the Protocol used is '**Serial**', the COM Port assigned is **3** and the Baud Rate is **9600**.

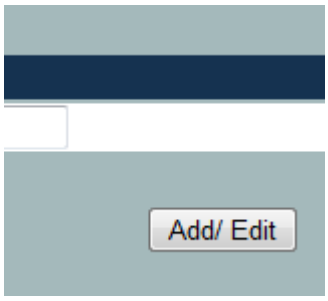
Under **Device Settings**.

For this example, the Mode selected is '**Standalone**' and the device selected on the Setup list is '**BUC (Feedmount-Integrated)**'.

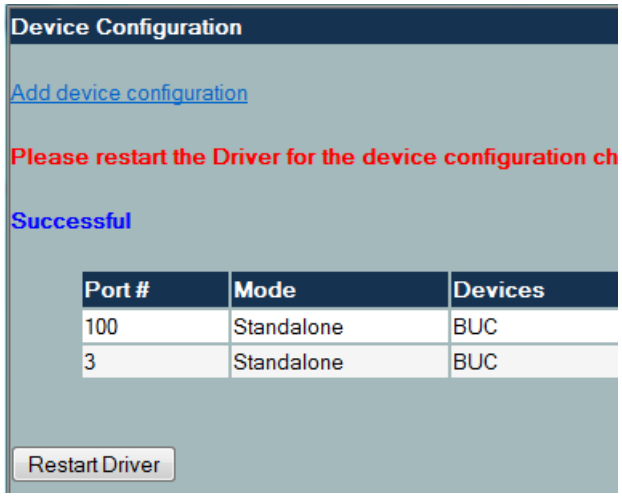
The '**Acronyms**' used in this example is the default '**BUC-1**'.



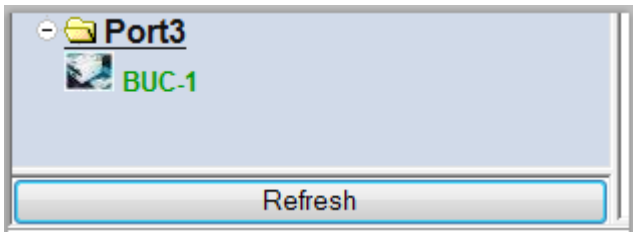
5. Click '**Add/Edit**' button.



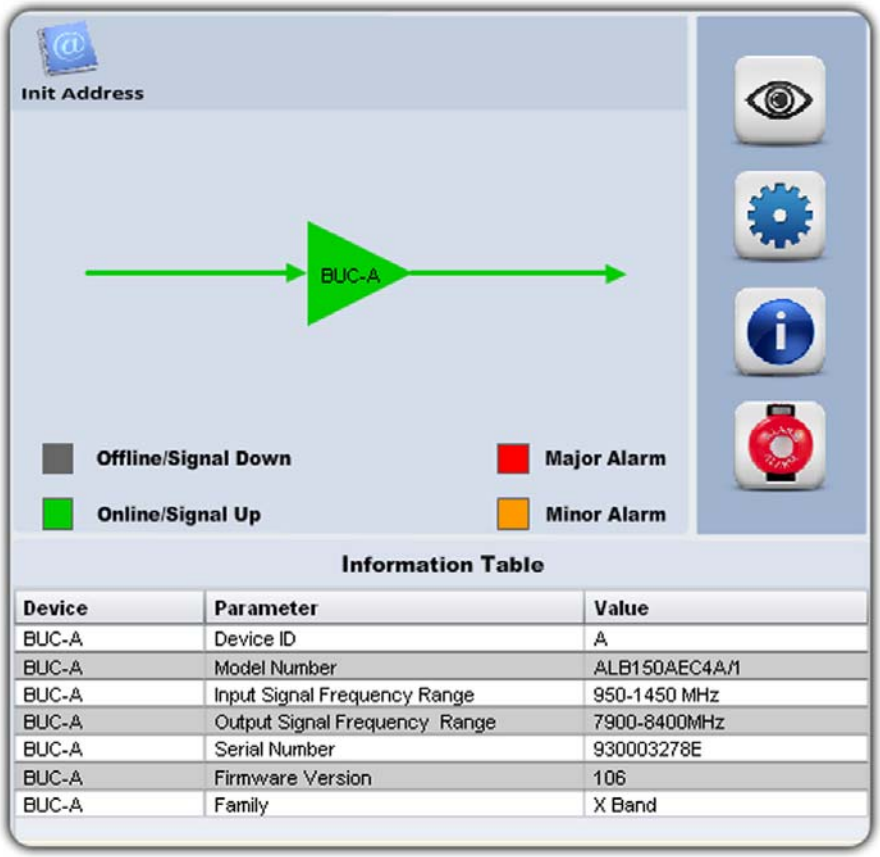
6. Click '**Restart Driver**' for the changes to take effect.



7. Click **'Refresh'** to refresh the display on the Agilis EMS main window. The Tree Menu should display the newly configured device along with the port number.



8. The block diagram of the newly configured device will now be displayed on the Agilis EMS main window.


Init Address
BUC-A
Offline/Signal Down
Major Alarm
Online/Signal Up
Minor Alarm
Information Table
Device | Parameter | Value
BUC-A | Device ID | A
BUC-A | Model Number | ALB150AEC4A/1
BUC-A | Input Signal Frequency Range | 950-1450 MHz
BUC-A | Output Signal Frequency Range | 7900-8400MHz
BUC-A | Serial Number | 930003278E
BUC-A | Firmware Version | 106
BUC-A | Family | X Band

4.2.7 Modifying Configuration Parameters

Click on the '**Configuration**' icon from the control panel to SET device configuration parameters.

To change the values of the device, simply click on the boxes where the present values are being displayed. A new window would pop up for the user to enter/select the desired value. Configuration parameters are subjective to equipment type. For the BUC, the configurable parameters are the **RF Output** and **Attenuation**.

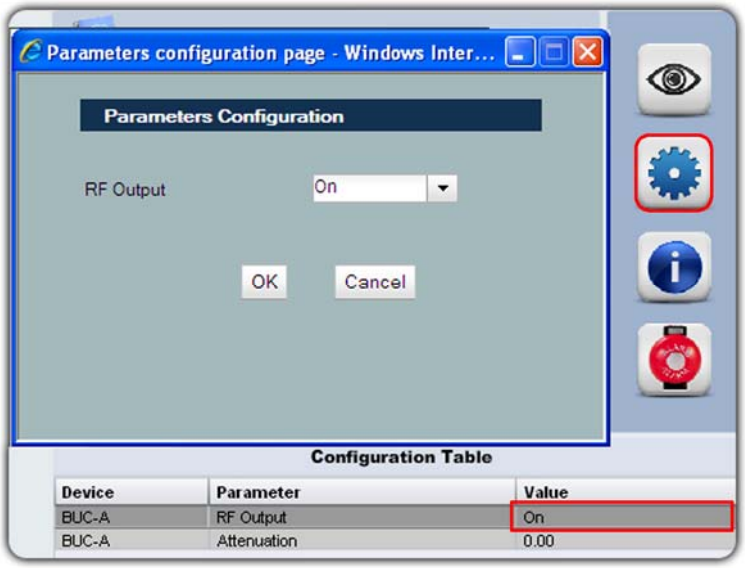


Figure 4.4 Configuration button

4.3 Monitor & Control via HTTP (Web)

If you have purchased the optional Ethernet M&C component, you can monitor and manage the BUC from your PC by simply using a standard web browser.

The new generation of devices from Agilis provides the capability to monitor and control the device through a ubiquitous web browser available on any PC. This simple interface offers a very user-friendly mechanism to maintain and configure a device for any system configuration and settings.

At the heart of the device is an embedded http web server. It is a software component that implements the HTTP protocol and allows any web browser to access information from the device. This architecture provides the following benefits:

- It provides a thin-client interface for a traditional application and any application running the http protocol.

- It provides support for http protocol for the distribution and acquisition of information to be displayed in the regular interface — possibly a web service, and possibly using XML as the data format.

- HTTP is a well studied cross-platform protocol and there are mature implementations freely available. It is seldom blocked by firewalls and intranet routers.

- HTTP clients (e.g. web browsers) are readily available with all modern computers.

4.3.1 Connecting the PC to BUC

To monitor and control the BUC using the WEB interface via an Ethernet connection, connect your PC LAN port to the BUC RJ45 port using either a cross LAN cable or an Ethernet hub. A DB9 to RJ45 converter may be provided by Agilis for this connection (P/N: 2502041166).

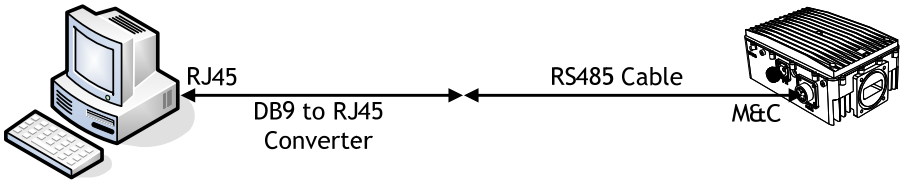


Figure 4.5 Connecting via RJ45

4.3.2 Connecting to the Web Interface

Once your BUC is physically connected to the PC, follow the procedure below to view the monitoring interface.

Step 1 Setup a static IP address for your LAN connection.

1. Navigate to your LAN connection properties. If you are using Windows 7, this is located in the “Network and Sharing Center” window. If you are using any other Windows system, please navigate

to the "Network Connections" window. Both windows can be accessed via your PC's "Control Panel".

2. Click the network connection corresponding to the Ethernet port that the BUC is connected to and open the "Properties" window.

3. Scroll to the "**Internet Protocol (TCP/IP)**" option and click the **[Properties]** button. This will open the "Internet Protocol (TCP/IP) Properties" dialog window.

4. Here, select **Use the following IP address** and configure as follows:

   IP Address: 192.168.1.10

   Subnet mask: 255.255.255.0

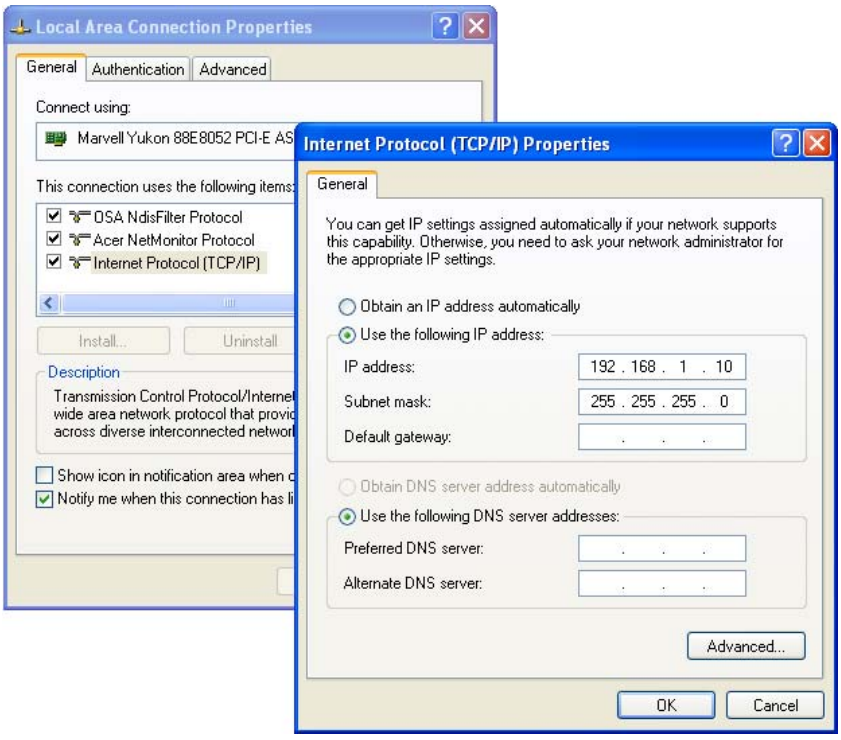

Local Area Connection Properties
General
Authentication
Advanced
Connect using:
Marvell Yukon 88E8052 PCI-E AS
This connection uses the following items:
OSA NdisFilter Protocol
Acer NetMonitor Protocol
Internet Protocol (TCP/IP)
Install...
Uninstall
Description
Transmission Control Protocol/Internet
wide area network protocol that provic
across diverse interconnected networ
Show icon in notification area when c
Notify me when this connection has li
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 10
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 4.6 Configuring static IP

5. Click **[OK]** and exit the both properties windows.

Step 2 Activate your Microsoft Internet Explorer web browser.

🕮 **Note:** The BUC's HTTP module is designed to work in Internet Explorer. If you are using any other web browser, alignments may be different and some functions may not work properly.

Step 3 Disable proxy server on the web browser.

1. Select **"Tools > Internet Options"** from your menu bar.
2. Click the **"Connections"** tab. At the bottom of this window, click the **[LAN Settings]** button.
3. In the new dialog window that appears, ensure that the "Proxy Server" checkbox is unchecked.

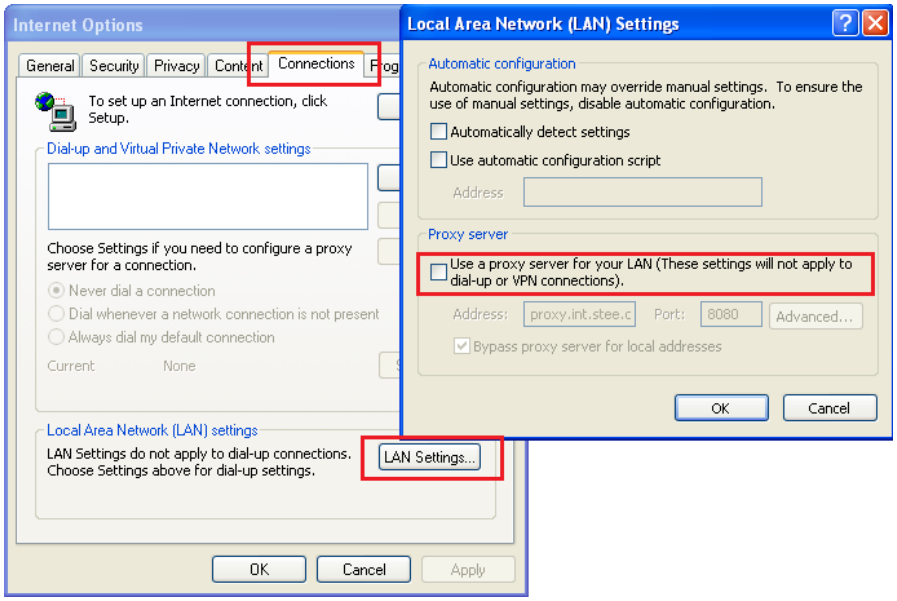


Figure 4.7 Disabling proxy server

4. Click **[OK]** to exit the screen.

Step 4 In the address bar, enter the BUC's access IP address. The BUC's default IP address is **192.168.1.1**. A Welcome page similar to the one below should display.

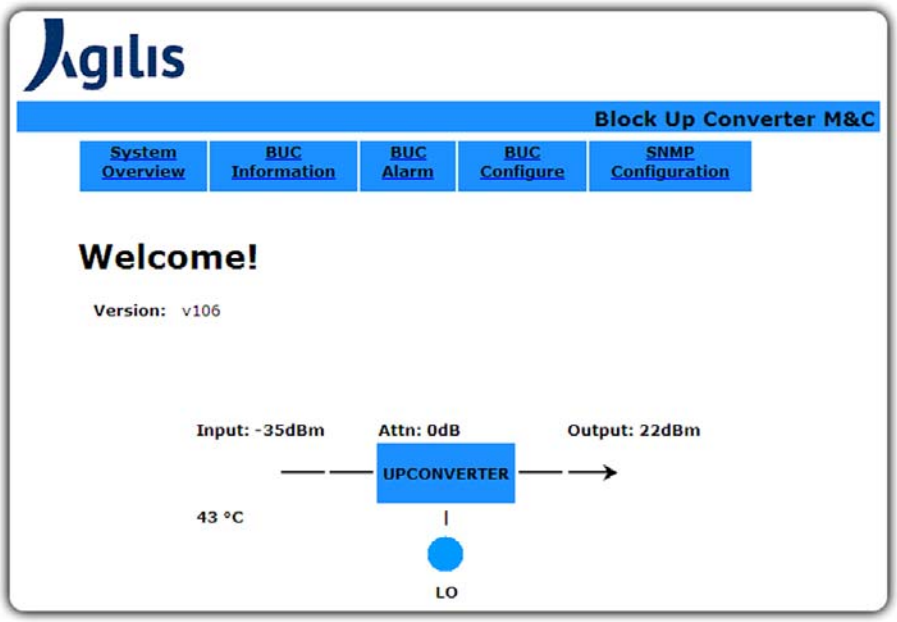


Figure 4.8 BUC's web interface

This screen displays the Web Page Version and a pictorial representation of the BUC operating status. You can use the menu on the top of the screen to navigate to the various other functions.

This page is automatically refreshed every 500ms and provides a summary of the operating parameters of the connected BUC.

4.3.3 Monitoring BUC Status

To view basic information on the BUC such as device serial number, ID, IP address and operating status, click **"BUC Information"** on the left menu.

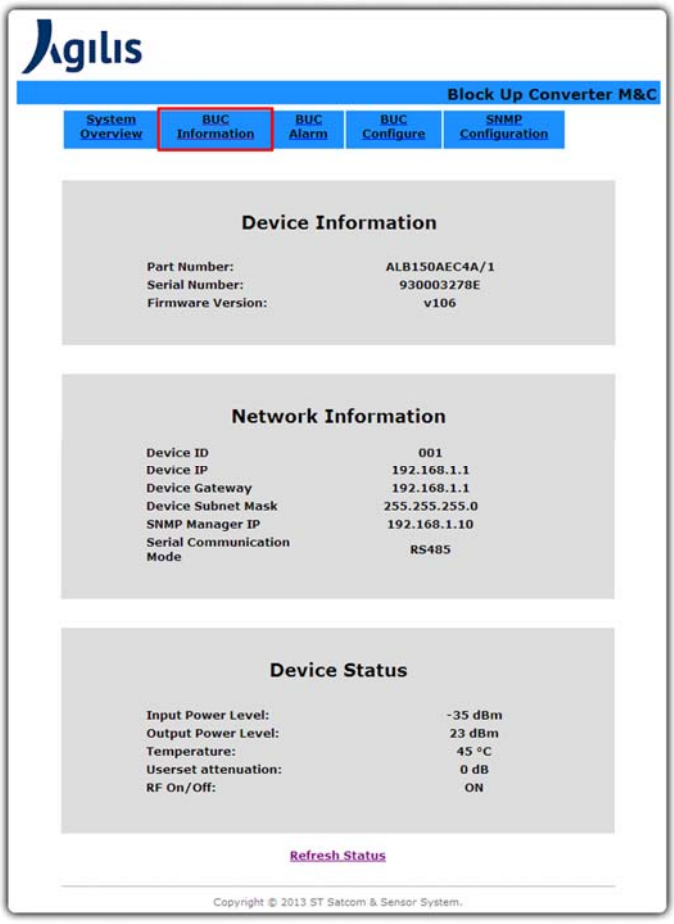


Figure 4.9 BUC and network status information

Three sets of information are displayed in this screen. This includes:

- Device Information

  This displays the BUC hardware information including the part number, serial number and firmware version.

- Network Information

  This displays the internal network settings of the BUC including device ID, web IP address and gateway, subnet mask, SNMP IP and the serial communication mode.

- Device Status

  This displays the detailed operating information and parameters of the BUC such as the current unit temperature, attenuation value, redundancy modes and state, input and output power level etc.

This screen automatically refreshes every 500ms to provide an updated summary of the BUC's operating parameters. You can also click **"Refresh Status"** at the bottom of the screen to manually refresh the page.

To view BUC Alarms, click **"BUC Alarm"** menu button.

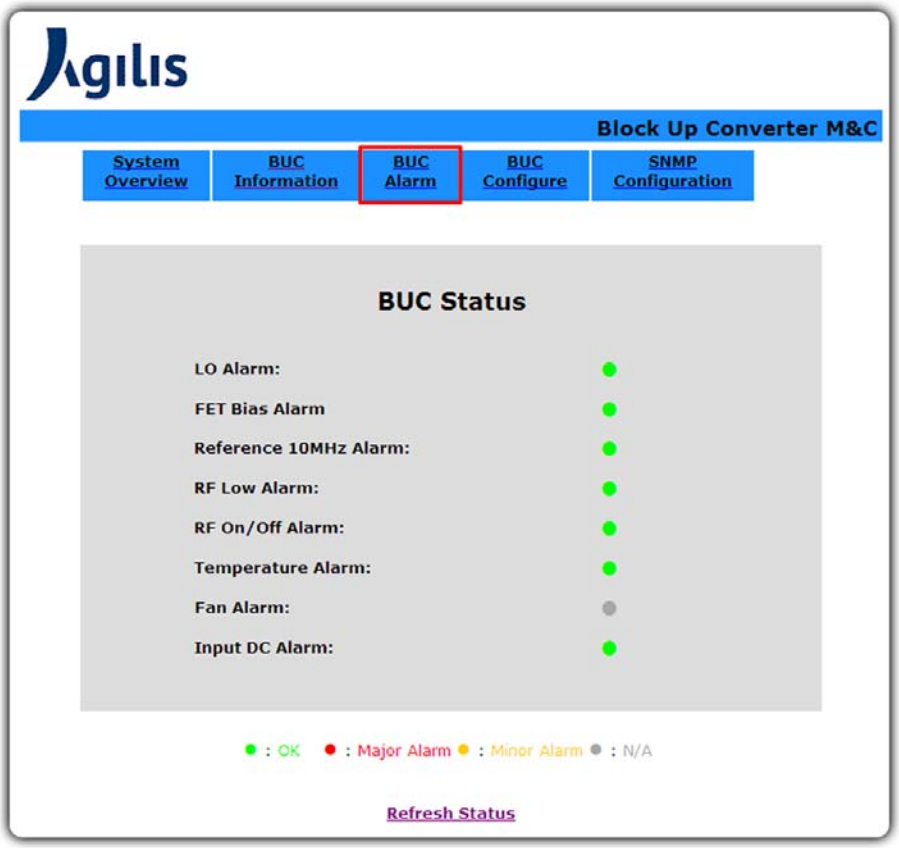


Figure 4.10 BUC alarm status information

The BUC alarm information is displayed in this screen.

- BUC Alarms

  A list of alarms and their corresponding status related to the BUC operation are displayed here.

Each alarm can display one of four colour states.

- Green: Indicates that there is no alarm for the corresponding status.
- Red: Indicates a major alarm. Corrective action should be taken immediately.
- Amber: Indicates a minor alarm. Correction action should be taken if necessary.
- Grey: Indicates that this status is not applicable for the BUC being monitored.

This screen automatically refreshes every 500ms to provide an updated summary of the BUC's operating parameters. You can also click **"Refresh Status"** at the bottom of the screen to manually refresh the page.

4.3.4 Configuring the BUC

You must login to edit any configuration of the BUC via this HTTP interface. Click **"BUC Configuration"** and the login window will appear. Enter the login name and password and click **[OK]** to enter the configuration screen.

The factory default login name and password is "**admin**" and "**admin**" respectively.

🕮 Note: Both the **"BUC Configuration"** and **"SNMP Configuration"** screens can only be accessed after logging in. Access to both screens is maintained after logging in until the browser is closed.

LOGGING IN

Figure 4.11 Logging in

The configuration screen includes three sets of configurations, "Network Configuration", "RF Operation" and "Password Setting".

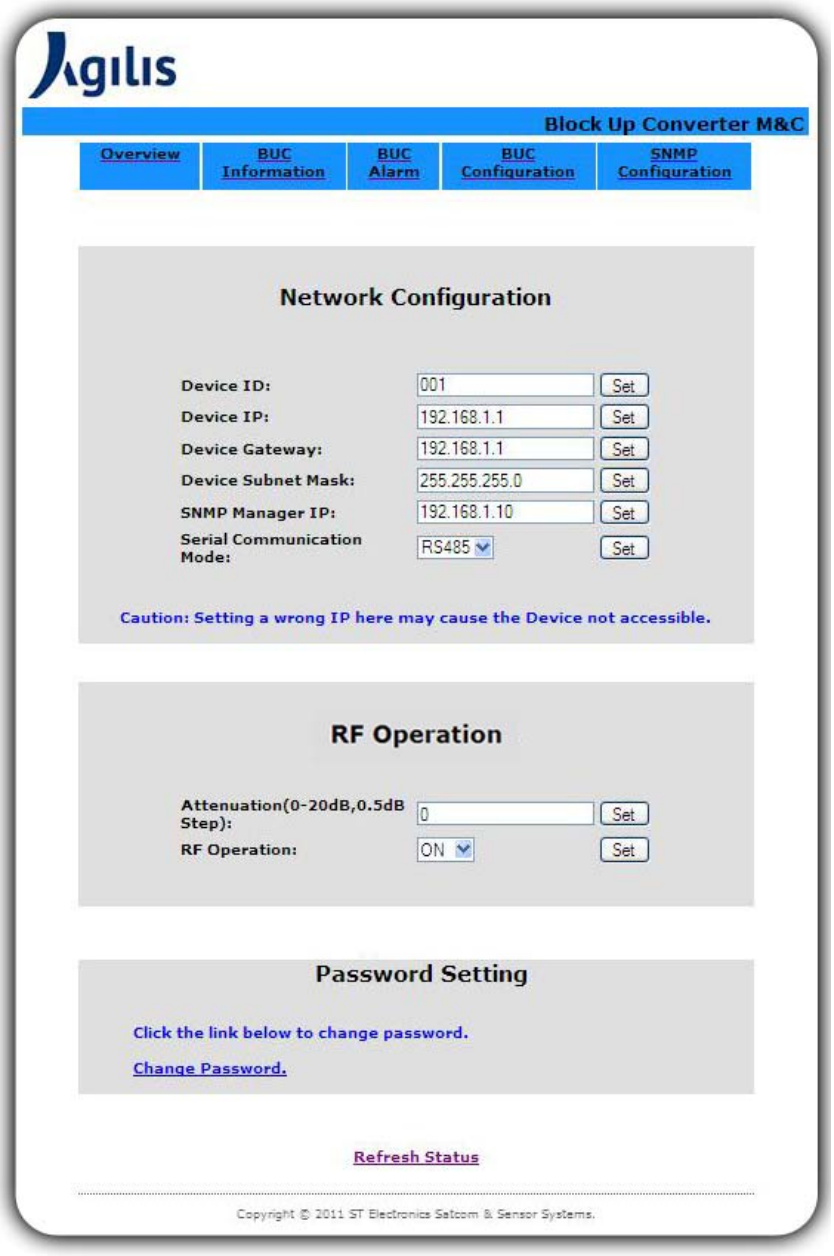


Figure 4.12 Device Configuration Screen

The configuration screen includes four sets of configurations - “Network Configuration”, “BUC Operation”, “Redundancy Operation” and “Password Setting”.

MODIFYING BUC NETWORK SETTINGS

“Network Configuration” allow you to configure the BUC network information including the **Device ID**, **IP** and **Gateway** addresses and **Subnet Mask**. You can also specify the IP address of the **SNMP Manager** that communicates with this BUC and select the **Serial Communication Mode** used to connect to the PC.

To modify any parameters, enter the desired value into the textboxes and click the corresponding **[Set]** button.

WARNING: Setting a wrong IP in Network Configuration may cause the Device not accessible.

MODIFYING THE BUC OPERATION PARAMETERS

"RF Operation" allow you to configure the BUC operating parameters such as **Attenuation** and **RF Operation**.

To modify any parameters, enter the desired value into the textboxes or select from the drop down menu and click the corresponding **[Set]** button.

CHANGING THE PASSWORD

"Password Setting" allow you to change your current password.

To change password, click on the Change Password link and fill out the required information.

4.3.5 Setting Up SNMP Parameters

"SNMP Configuration" lets you specify how the BUC communicates with the SNMP Manager. If you have yet to login to the HTTP interface, you will be prompted to do so when clicking the **"SNMP Configuration"** menu option. The factory default username and password is "admin", "admin" respectively.

Note: Both the **"BUC Configuration"** and **"SNMP Configuration"** screens can only be accessed after logging in. Access to both screens is maintained after logging in until the browser is closed.

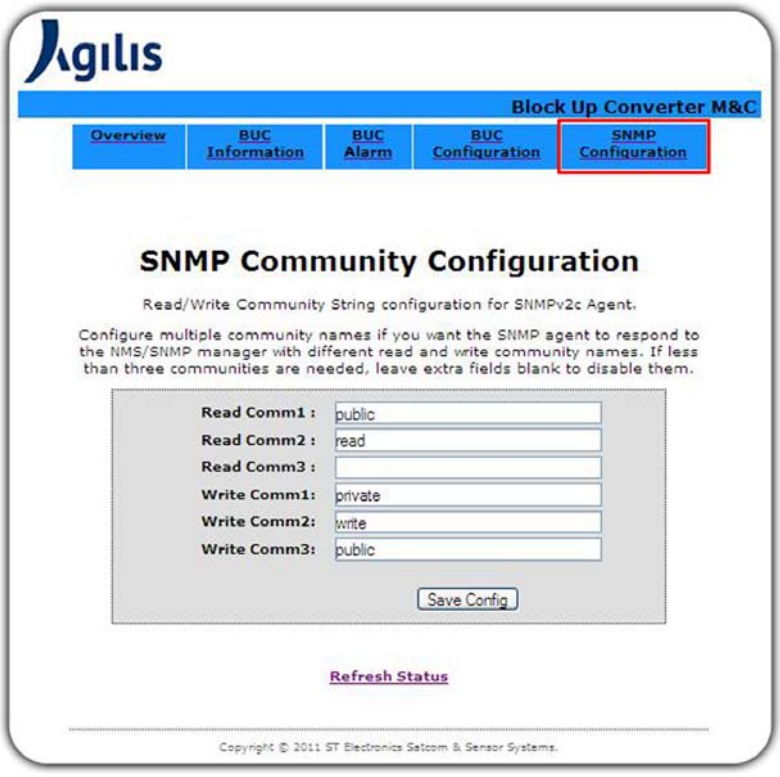

Agilis
Block Up Converter M&C
Overview
BUC Information
BUC Alarm
BUC Configuration
SNMP Configuration
SNMP Community Configuration
Read/Write Community String configuration for SNMPv2c Agent.
Configure multiple community names if you want the SNMP agent to respond to the NMS/SNMP manager with different read and write community names. If less than three communities are needed, leave extra fields blank to disable them.
Read Comm1 : public
Read Comm2 : read
Read Comm3 :
Write Comm1: private
Write Comm2: write
Write Comm3: public
Save Config
Refresh Status
Copyright © 2011 ST Electronics Satcom & Sensor Systems.

Figure 4.13 SNMP v2c configuration settings

4.4 Monitor & Control via SNMP

Simple Network Management Protocol (SNMP) provides a framework for the definition of management information and the exchange of that information. A SNMP manager is a software module that manages part or all of the system configurations while an agent is a software module in the unit that is being managed. Transfer of information can be initiated by both the manager (via polling) and the agent (via SNMP Trap).

By default, the manager initiates requests and receives responses via port 161. The agent sends SNMP Trap messages via port 162.

A database describing the unit's application parameters is stored in the SNMP agent. This SNMP Management Information Base (MIB) database is used to interpret the signals requested and received between the manager and agent. The database includes both a standard set of values common to hardware nodes on a network and a private set of values that is unique to the specific unit.

Object Identifiers (OID) are a series of numbers that uniquely identify variable to an SNMP agent. OIDs are arranged in a hierarchical tree structure.

The figure below shows the categorization of BUC parameters that are used in defining the MIBs for SNMP enabled Agilis products. These categories help define various device parameters very distinctly and help for easy access and navigation when using any manager.

🕮 **Note:** This figure shows the full set of categories and does not apply to all Agilis products. These categories are closely used in defining the product MIBS for all the SNMP enabled devices. The set of parameters that are available in each Agilis product will differ.

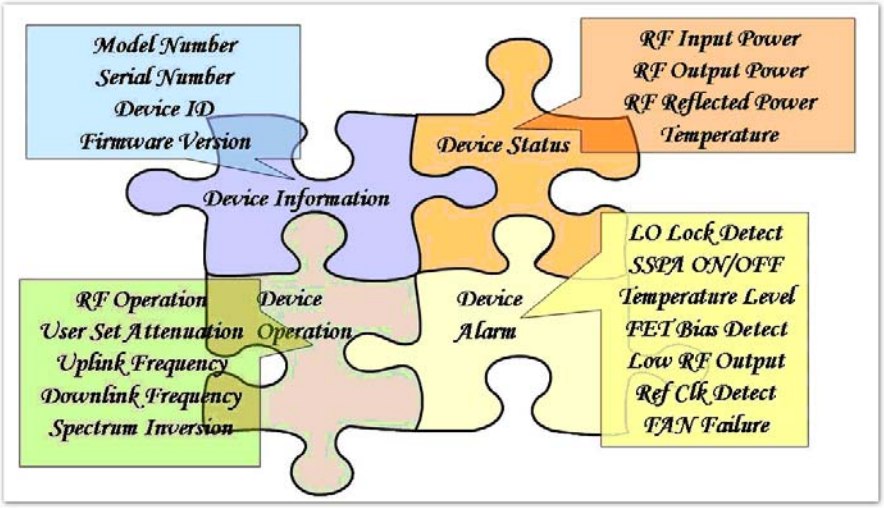


Figure 4.14 SNMP MIB categories

4.4.2 Connecting the PC to BUC

If you have purchased the optional Ethernet M&C component, you can monitor and control the BUC using an SNMP manager via an Ethernet connection. Connect your PC LAN port to the BUC RJ45 port using either a cross LAN cable or an Ethernet hub. A DB9 to RJ45 converter may be provided by Agilis for this connection (P/N: 2502041166).

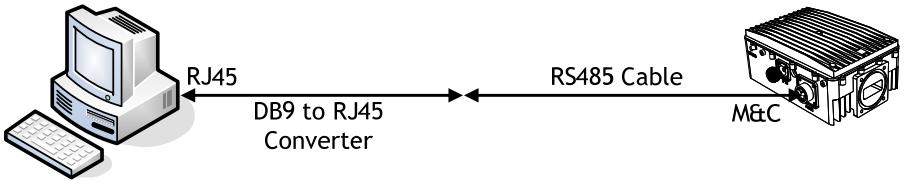


Figure 4.15 Connecting via the RJ45

4.4.3 Connecting to the SNMP Interface

Once your BUC is physically connected to the PC, follow the procedure below to connect the SNMP agent module to a SNMP manager in your PC.

Step 1 Activate your SNMP manager. Agilis products will work with most standard SNMP managers available in the market.

🕮 **Note:** For the purpose of this manual, all screenshots in this section are made using the SNMP Manager from iReasoning. You can download or purchase any standard third party SNMP Manager software and install it into your PC.

Step 2 In the SNMP manager, enter the BUC's access IP address. The following show the default configuration:

Agent IP: 192.168.1.1

Subnet Mask: 255.255.255.0

SNMP Manager: 192.168.1.10

Step 3 Insert the CD included in your package into your PC's disc drive and load the MIB definition file ("AGILIS-PROD-XXX-MIB.mib") into your SNMP manager.

You can also download the MIB definition file from our website at www.agilissatcom.com.

Once the file has been loaded, a tree structure should be displayed in your manager as shown below.

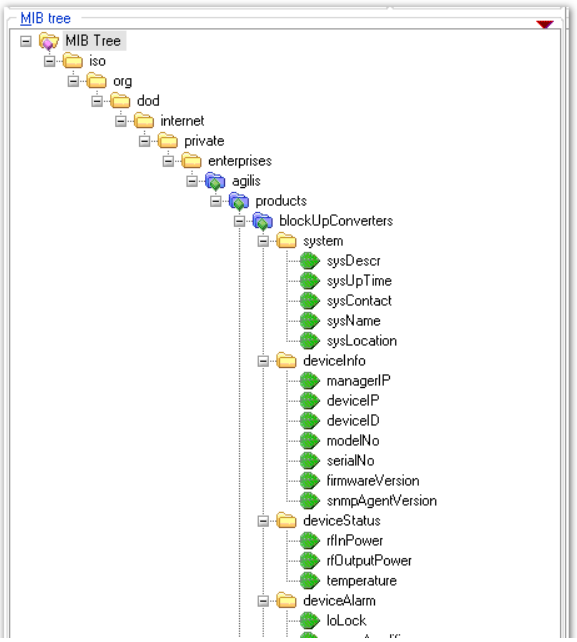


Figure 4.16 Example MIB tree

4.4.4 Managing the BUC via an SNMP Manager

NAVIGATING THE MIB TREE

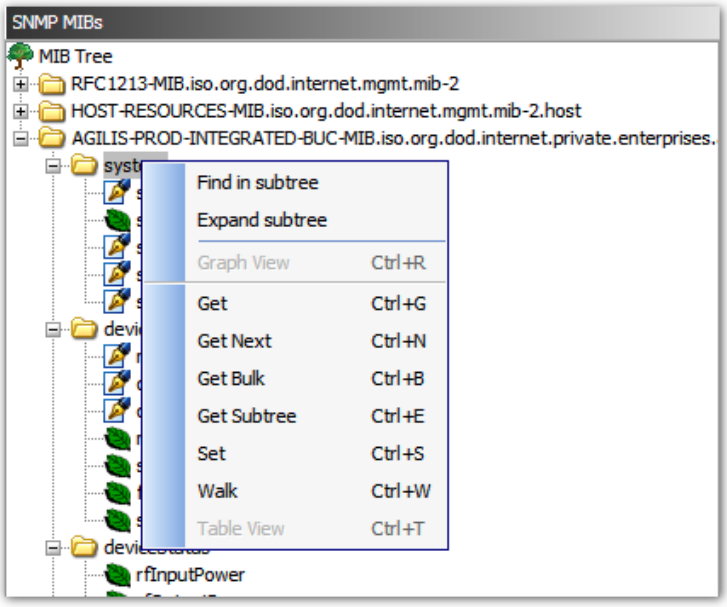


Figure 4.17 MIB tree

Each item in the tree is called a node. A parent or root node can be expanded into branches. You can view each branch by clicking the +/- icons in the tree. Each branch eventually terminates at leaf nodes.

To search for a specific node within a branch, right-click on the parent node of that branch and select “Search” and type the name of the node to search for.

You can expand or collapse the entire tree or branch by right-clicking on the parent node and selecting the “Expand subtree” or “Collapse subtree” option.

UNDERSTANDING SNMP OPERATIONS

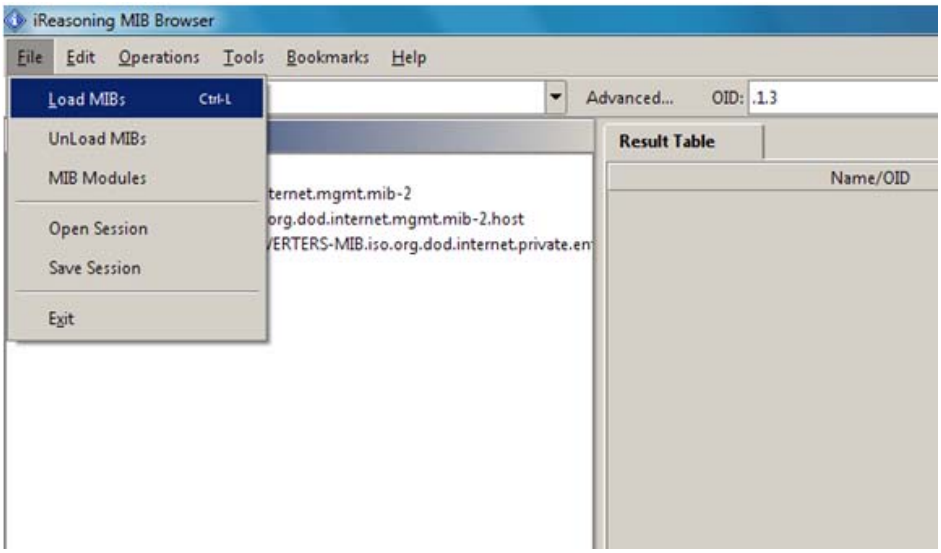
The full set of SNMP commands that can be initiated from the SNMP manager is explained in the table below.

To execute a command on any node in the tree, simply select the node and right-click. From the menu that appears, select the command to execute. Note that not all commands are available for every object in the tree.

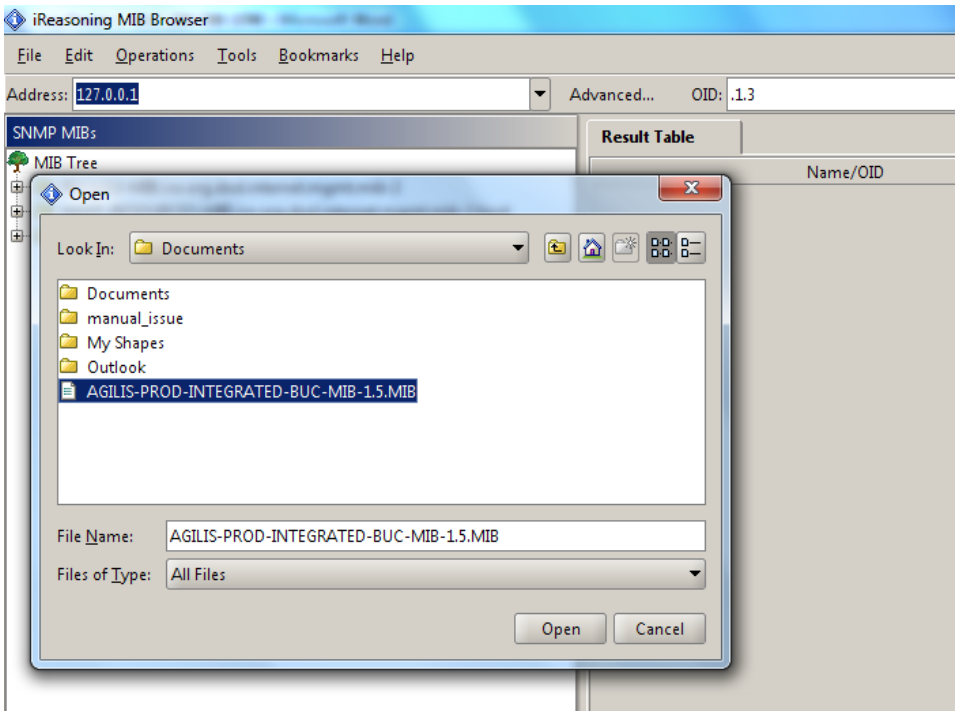
SNMP Command	Explanation
GET	Used to obtain a single piece of information from the BUC such as the BUC ID etc.
GET NEXT	Used to obtain two pieces of information from the selected object and the next object.
GET BULK	Used to obtain multiple pieces of information from the BUC at once.
GET SUBTREE	Used to poll for information corresponding to all objects within the subtree.
SET	Used to configure a specific parameter in the BUC. Note that this command will only be available for configurable parameters.
WALK	Used to poll for all data from the objects within the tree.
TABLE VIEW	Used to poll for and view data table of an object. Note that this is only available if the selected object stores tabulated data.

USING THE MIB BROWSER

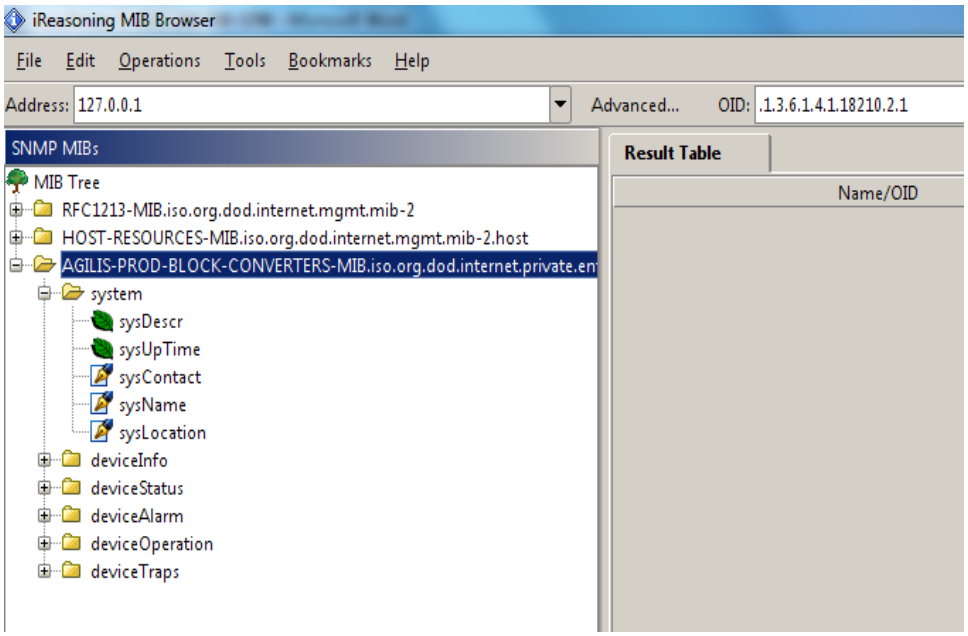
1. Open the MIB Browser. In this example, we use iReasoning MIB Browser to configure SNMP. Click File and select Load MIBs.



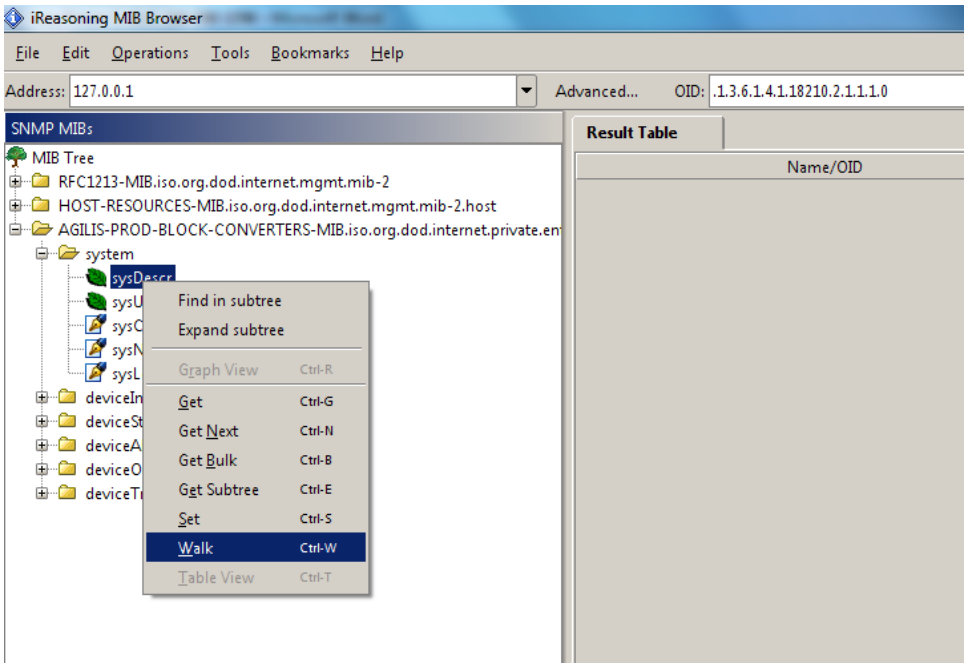
2. Once done, locate the MIB file in your system.



3. Once the MIB file is loaded, the SNMP MIB details will appear. Click on the folders to view more information.



4. Execute a command on any node in the tree. Right click on the node and select a command you want to execute. In this example, “Walk” is selected.



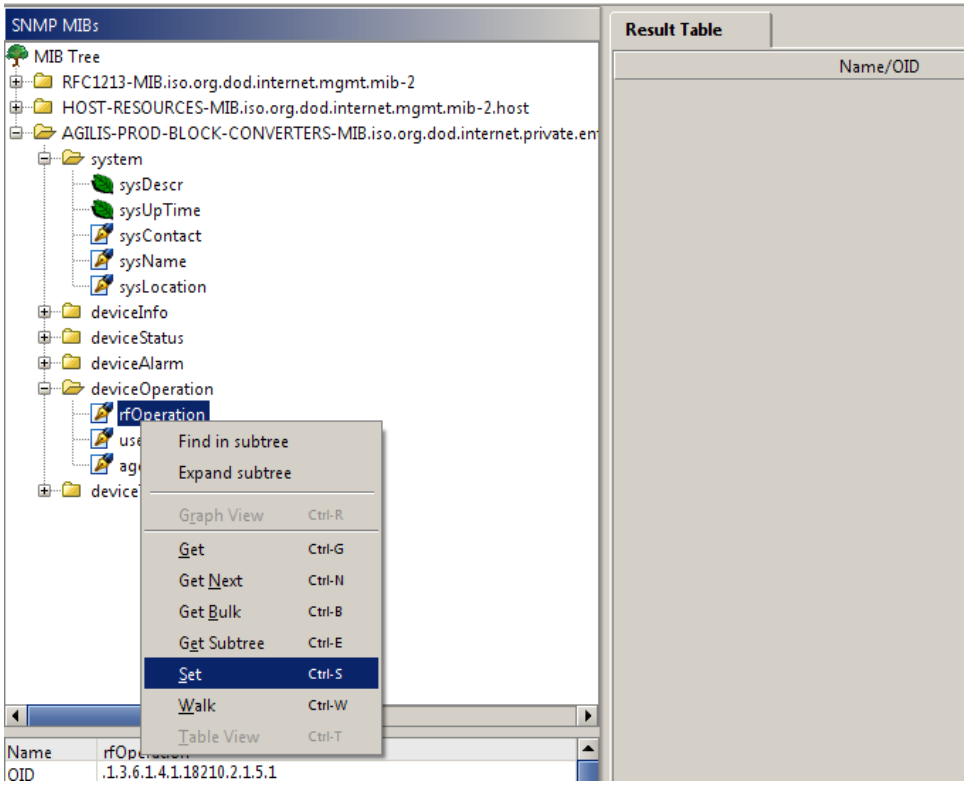
5. SNMP values will be retrieved once a command is selected. Below is an example once “Walk” is selected. Once “Walk” is selected, all nodes’ information in the tree will be retrieved.

The figure below shows an example of the parameters retrieved by the "WALK" command.

Name/OID	Value	Type
sysDescr.0	AGILIS BLOCK-UP-CONVERTER	OctetString
sysUpTime.0	1 minute 40 seconds	TimeTicks
sysContact.0	Customer-Service +65-65217959	OctetString
sysName.0	ALBX SERIES Ku-BUC	OctetString
sysLocation.0	ST ELECTRONICS, SINGAPORE	OctetString
managerIP.0	10.67.71.16	IpAddress
deviceIP.0	10.67.71.251	IpAddress
deviceID.0	001	OctetString
modelNo.0	ALB180FA2-200-	OctetString
serialNo.0	1111111111	OctetString
firmwareVersion.0	10?	OctetString
snmpAgentVersion.0	v100	OctetString
rfInputPower.0	12	OctetString
rfOutputPower.0	153	OctetString
temperature.0	-168	OctetString
loLock.0	alarm	Integer
fetBias.0	notApplicable	Integer
reserved1.0	notApplicable	Integer
rfLow.0	ok	Integer
powerAmplifier.0	alarm	Integer
tempLevel.0	ok	Integer
rfReflPowerLevel.0	ok	Integer
rfOperation.0	switchOff	Integer
userSetAtten.0	48.5	OctetString
rcuOperation.0	auto	Integer
rcuSwitch.0	path2	Integer
path-1-Status.0	alarm	Integer
path-2-Status.0	ok	Integer

Figure 4.18 SNMP WALK

6. To configure and update the SNMP values, right click on the nodes in deviceOperation folder and select "Set".



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Chapter 5 Maintenance & Troubleshooting

This chapter details various system maintenance operations to help ensure that your system works under optimal conditions.

WARNING: Disconnect all power sources before performing any system maintenance and repair.

5.1 Preventive Maintenance

This section explains the various maintenance checks that should be routinely carried out to ensure that the system is working correctly and in optimal condition.

Ideally, you should perform a complete maintenance on the system at least twice a year and record all updates and changes made to each ODU "SETUP RECORD". Notify all users that may be affected of a system down time of roughly two hours prior to maintenance.

WARNING: Disconnect and re-connect cables during maintenance properly to avoid causing any damage to the cables that may result in intermittent problems in the future.

Connect the output interface of the equipment to a proper load.

5.1.1 Gains Testing

The test procedure is as follows:

Step 1 Look at the demodulator status (DEMODULATOR LOCK indicator on the modem) and check that is “LOCKED” to the receive signal.

Step 2 Check that the transmit and receive configurations on both the modem and the X-BUC complies with the SETUP RECORD. If there are any discrepancies, contact the personnel responsible for the previous record for clarifications before proceeding.

Step 3 Turn on the pure carrier of the modem and measure the power level using a spectrum analyzer.

Step 4 If your modem is connected to an AC power supply, measure the indoor AC power supply to the modem to check that the voltages are within the tolerance limits. You are recommended to use an Automatic Voltage Regulator if your power source falls outside of these limitations.

🕮 Note: The limit range will differ according to your modem’s AC voltage requirements. Please use the table as a guideline only.

Table 5-1 AC power tolerance

Tolerance	X VAC 50 Hz, where X is the AC requirement of the device
Live – Neutral	X VAC ± 15%
Live – Earth	X VAC ± 15%
Neutral – Earth	< 5 VAC

Step 5 Check that all IFL and RF cables are labelled.

Step 6 Ensure that all cables are in good working condition by performing the following procedure:

1. Remove cables at both ends of the connection before taking measurements.
2. Using a mega ohm meter, measure both ends of the cables.

Step 7 Again using a mega ohm meter, measure the ground resistance of the antenna. This value should not be greater than 10Ω.

Step 8 Reconnect the transmit cable to the modem and measure the power level of the pure carrier transmitted into the X-BUC's input port. Calculate the IFL loss and check that it is similar to the value recorded in the SETUP RECORD.

WARNING: Turn off the X-BUC and connect a power attenuator (30dB, >30W) to the RF OUT port of the BUC before step 8 below.

Step 9 Turn on the BUC and connect the IF IN cable. Record the RF OUT power level and calculate the uplink gain. Check that the resultant gain complies with both the SETUP RECORD and the gain setting on the BUC.

Step 10 Measure the power level and C/N_0 of the receive carrier under consideration at the BUC's RF OUT port. Check the readings against the SETUP RECORD. If there is a significant variation in the two, contact the transmit site for confirmation.

Step 11 Measure the level at the modem's IF input to determine the Rx IFL loss. Match this value against the SETUP RECORD.

5.1.2 Completing the Maintenance

Completing each maintenance service requires the following actions:

- Check the sealing on existing connections and re-seal if necessary.
- Tighten and re-seal all connections and important joints that were disconnected for maintenance.
- Check and ensure that all waveguide joints are properly equipped with a gasket and sealed.
- Cover all unused connectors with a cap and seal.
- Update the SETUP RECORD.

5.2 Understanding Faults in the BUC

The table below lists the faults that may arise in the BUC. The following information can be found in this table:

- Fault Indication: How do you tell that a fault has occurred?
- Possible Causes: What may have caused the fault and how do you check?
- Solution: How do you resolve the fault?

Table 5-2 Troubleshooting faults in the BUC

Fault Indication	Possible Causes	Solution
LED is off	BUC is not on	Turn on the DC power source connected to the unit.
	Cables are loose	Hand-tighten all cable connections to the BUC.
	Cables are faulty	Replace any faulty cables.
LO unlock	Circuit failure	Please contact Agilis for further support.
	10MHz reference signal power level from modem might be low	Check 10MHz reference signal level from modem. It should be ± 5 dBm at L-Band input of the BUC.
LED is red	LO unlock	10MHz reference signal power level from modem might be low
	SSPA is off	Check the software option to power on the SSPA
	Temperature Alarm	Allow the unit to cool down before powering it back on
	FET Bias Alarm	Please contact Agilis for further support.
	Reference 10MHz Alarm	Check 10MHz reference signal level from modem. It should be ± 5 dBm at L-Band input of the BUC.
	Input DC Alarm	BUC Input DC power supply is <16V. Please check power supplied by the modem.

Fault Indication	Possible Causes	Solution
No RF output power	BUC is overheated	RF output is automatically disabled if the BUC is overheated. Allow the unit to cool to a safe operating temperature before enabling RF.
	RF ON/OFF Enabled	Check the BUC settings using the M&C software and enable RF ("On").
	Internal modules failure	One or more of the internal modules, such as the power module, driver and internal RF circuit, have may have failed. Please contact Agilis for further support.
	LO unlock	10MHz signal power level from modem might be low
	FET Bias alarm	Please contact Agilis for further support.
RF output power is low	Attenuation setting is too high	Check the attenuation setting using the M&C software and adjust accordingly.
	L-Band power level might be very low to get rated power from BUC	Please contact Agilis for further support. Check the L-Band signal level (~-30dBm) from the modem.

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Appendix A Customer Service

Agilis provides a variety of after-sales services. This chapter explains some of the services offered including warranty information, the Return Material Authorization process, parts replacement etc.

A.1 Warranty Information

If the unit fails due to defects in materials or workmanship, Agilis will, at its sole discretion, repair or replace the defective parts, free of charge, within two years from the date of its shipment from the Agilis production factory.

Note that shipping cost to Agilis will not be covered under this warranty guarantee.

This warranty will be voided, freeing Agilis from any liability or obligation to the Purchaser with respect to the product in the following situations:

- The product has been damaged during shipment
- Failure caused by products not supplied by Agilis or its authorized contractors and agents.
- Failure caused by operation of the product outside of its published electrical and environmental specifications or any causes other than ordinary use.
- Water ingress due to improper installation.

A.2 Return Material Authorization (RMA)

PRE-RMA CHECKLIST

Shipping the unit to and from your supplier or the factory for repair is a costly and time consuming procedure that may cause disruption in your system for a prolonged period of time. Hence, please inspect your system thoroughly using the checklist below to help us determine if return shipping is necessary.

Table A-1 Pre-RMA Request Checklist

Please check		
Product model / serial no:		
When did the unit fail:	☐ Initial startup ☐ Unit worked normally before failure	
Initial Fault Symptom:		
Consistent or intermittent fault	☐ Consistent ☐ Intermittent	
Duration of operation before the failure		
Are fans working normally?	☐ Yes ☐ No	
Is the airflow path blocked?	☐ Yes ☐ No	
10 MHz Ref. level at failure		
IF input level at failure		
Output power at failure		
LED status		
Is the device and setup properly grounded?	☐ Yes ☐ No	
Weather conditions just before failure	Air Temperature: _____ Heavy rain/snowfall/storms: _____	
AC Potential	Live – Neutral	
	Live – Ground	
	Neutral – Ground	
AC-DC converter working status		
Is the primary power source working and free of power spikes?	☐ Yes ☐ No	
Was there any recent power outages that affected the device?	☐ Yes ☐ No	

Please check	
Are connectors properly sealed and free from debris/water?	☐ Yes ☐ No
Replace the device with a working one (if available) and check if the system works.	☐ Works with the new device ☐ Does not work with the new device
Detail the diagnosis performed that localized the fault to the unit as the point of failure	

If you need to return the devices or any components to Agilis for repair, please contact Agilis to obtain a Return Material Authorization (RMA) number by filling in our RMA Request form. You can obtain this form via our website at www.agilissatcom.com. Once you receive a RMA number, carefully repack the unit and attach this number to the unit to be shipped to Agilis.

Agilis provides repair services for products under or out of warranty.

A.3 Additional Technical Support

If you require further technical support, please contact Agilis using the contact information below:

Address:	ST Electronics (Satcom & Sensor Systems) Pte Ltd. No. 29 New Industrial Road, ST Electronics Paya Lebar Building Singapore 536213
Service Hotline:	(+65) 6521 7959
Fax:	(+65) 6521 7333
Email:	techsvc_satcoms@stee.stengg.com

You can also visit www.agilissatcom.com for the addresses and contact information of our regional service centres.

Appendix B Unit Specifications & Outline

B.1 System Specification Tables

Table B-1 BUC specification tables

Frequency Range (MHz)			
	Input	Output	Low LO
X-Band	950 to 1450	7900 to 8400	6950
Transmit			
Rated Output Power	36dBm		
Small Signal Gain	56dB min		
Power Consumption (typ)	48W @ 24VDC input		
Gain Flatness	± 2.0 dB over the O/P frequency band		
Gain Variation	± 2.0 dB over the operating temperature range		
Phase Noise	@1kHz offset	-73 dBc/Hz	
	@10kHz offset	-83 dBc/Hz	
	@100kHz offset	-93 dBc/Hz	
Input VSWR	2.0:1 max		
Output VSWR	2.0:1 max		
Input Interface	50Ω N-type Female 75Ω F-type Female (Optional)		
Output Interface	WR112G		
Environmental			
Operating Temperature	-40°C to +60°C		
Relative Humidity	Up to 100% Weather Protection sealed to IP65		

External Reference		
Frequency	10MHz	
Power	-5 to +5 dBm	
External Reference Phase Noise Requirement @ Frequency Offset	@1kHz offset	-150dBc/Hz
	@10kHz offset	-155dBc/Hz
	@100kHz offset	-160dBc/Hz
Monitor and Control		
Monitor	BUC Temperature LO unlocked alarm Status alarm RF Input and RF Output Power LED Status Indicator	
Control	Adjustable gain with 0.5dB step size RF Output mute	
Interface	RS485 (Standard) SNMP/HTTP (Optional)	
Power Supply		
Operating Voltage	24VDC (range 18 to 60VDC)	
Mechanical		
Dimensions (LxWxH)	4W	153 L x 103 W x 65 H mm
Weight	4W	1.5 kgs
Colour	White Powder Coat	

B.2 Unit Outline Drawings

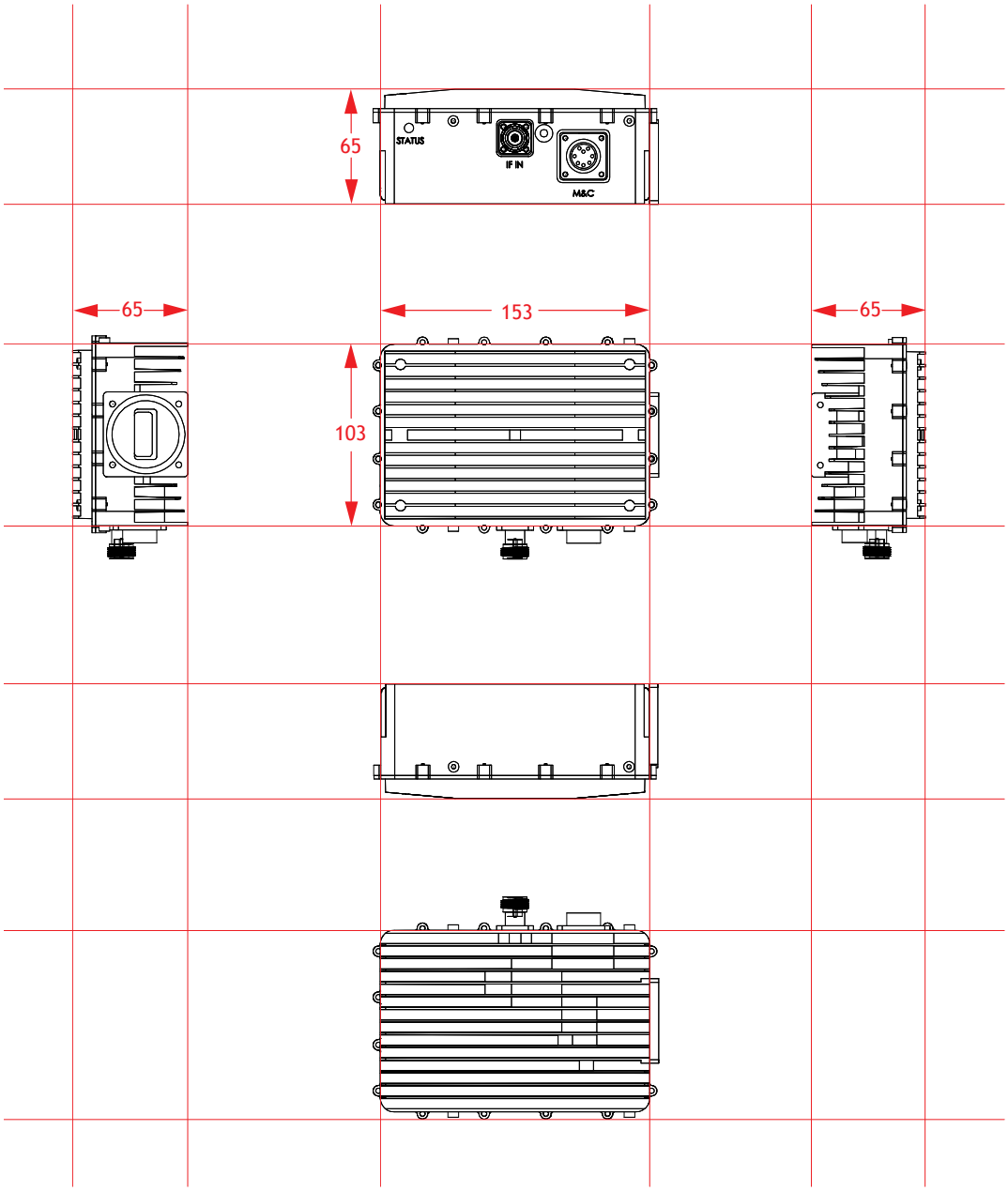

Figure B-1 4W X-BUC outline drawing

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Appendix C Compliance Standards

IEC 609501 – 2nd Edition	International Safety Standard for Information Technology Equipment
ETSI EN 301 489-12	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) Standard for radio equipment and services; Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the fixed Satellite Service (FSS)
ETSI EN 301 489-1	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility Standard for Radio Equipment and Services
FCC Class A	Two levels of radiation and conducted emissions limits for unintentional radiators (FCC Mark)

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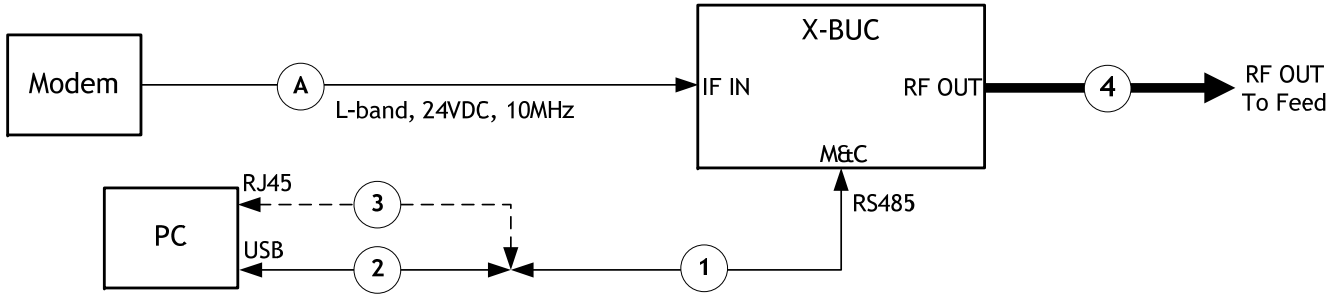
Appendix D Document Revision Log

Revision	Date	Description
A	August 2013	Initial Release

4W / 5W / 10W X-BUC Stand Alone System Configuration



LIST OF ACCESSORIES

Item No.	Agilis Part No.	Description	Length (m)	Quantity
1	2502041169	C/A FOR M&C VSAT (ETH, RS485)	2	1
2	6103480008	CONVERTER USB TO RS485	-	1
A	-	RF Cable (L-Band) from Indoor to Outdoor, N(M) to N(M)	To be arranged by the customer	
3	2502041166	C/A FOR VSAT EHT-DB9 TO RJ 45 CONVERTER (optional)	1	1
4	4203480039	Rx Reject Filter	-	1

LIST OF SYSTEM COMPONENTS

Agilis Part No.	Description	Quantity
ALBX50XXXX	X-Band Block Up Converter	1

Note: The table above is a typical accessories list for the BUC. Depending on your purchase order, your BUC package may not include certain optional cables. Please contact Agilis if you wish to purchase any of the above accessories.